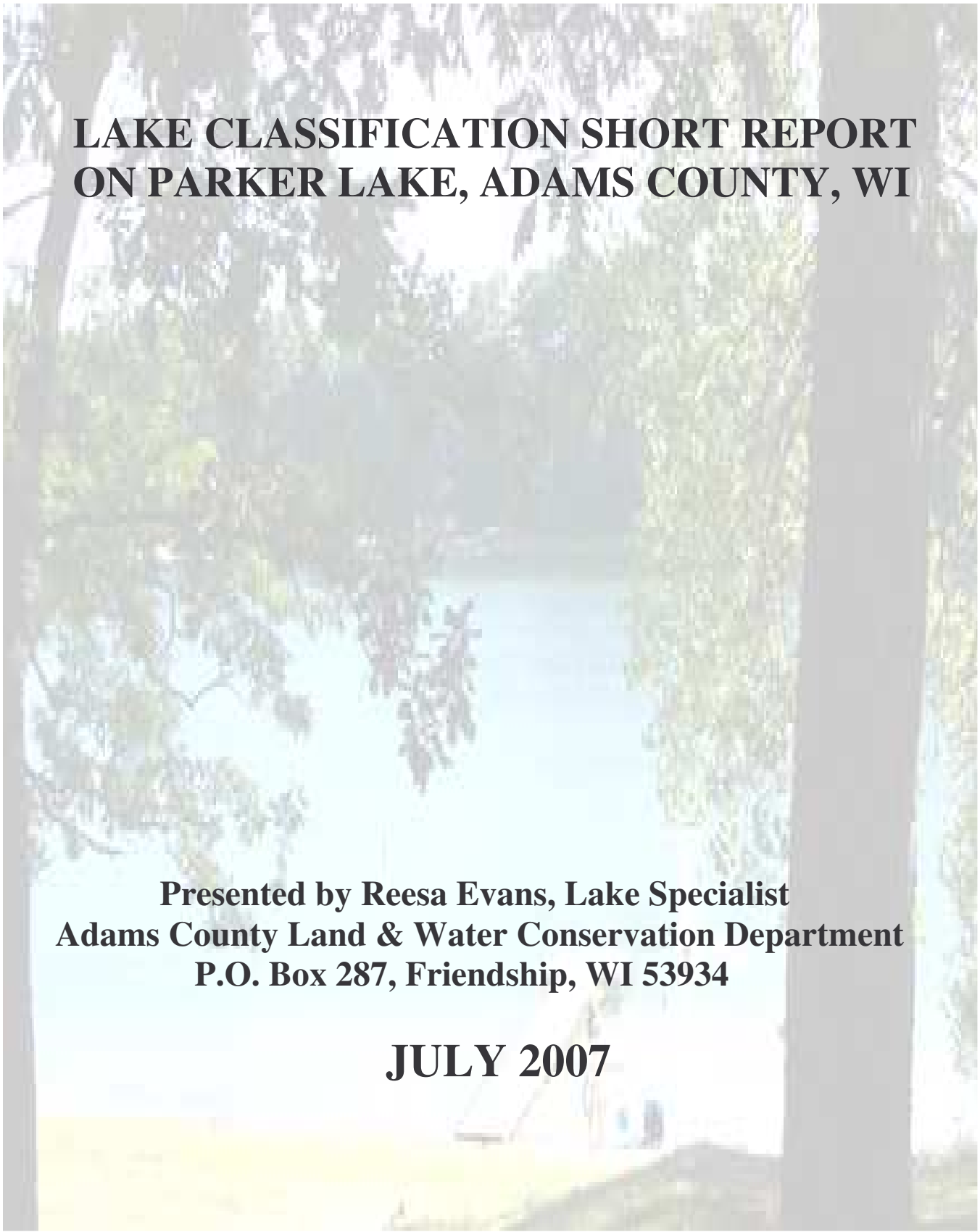

LAKE CLASSIFICATION SHORT REPORT ON PARKER LAKE, ADAMS COUNTY, WI

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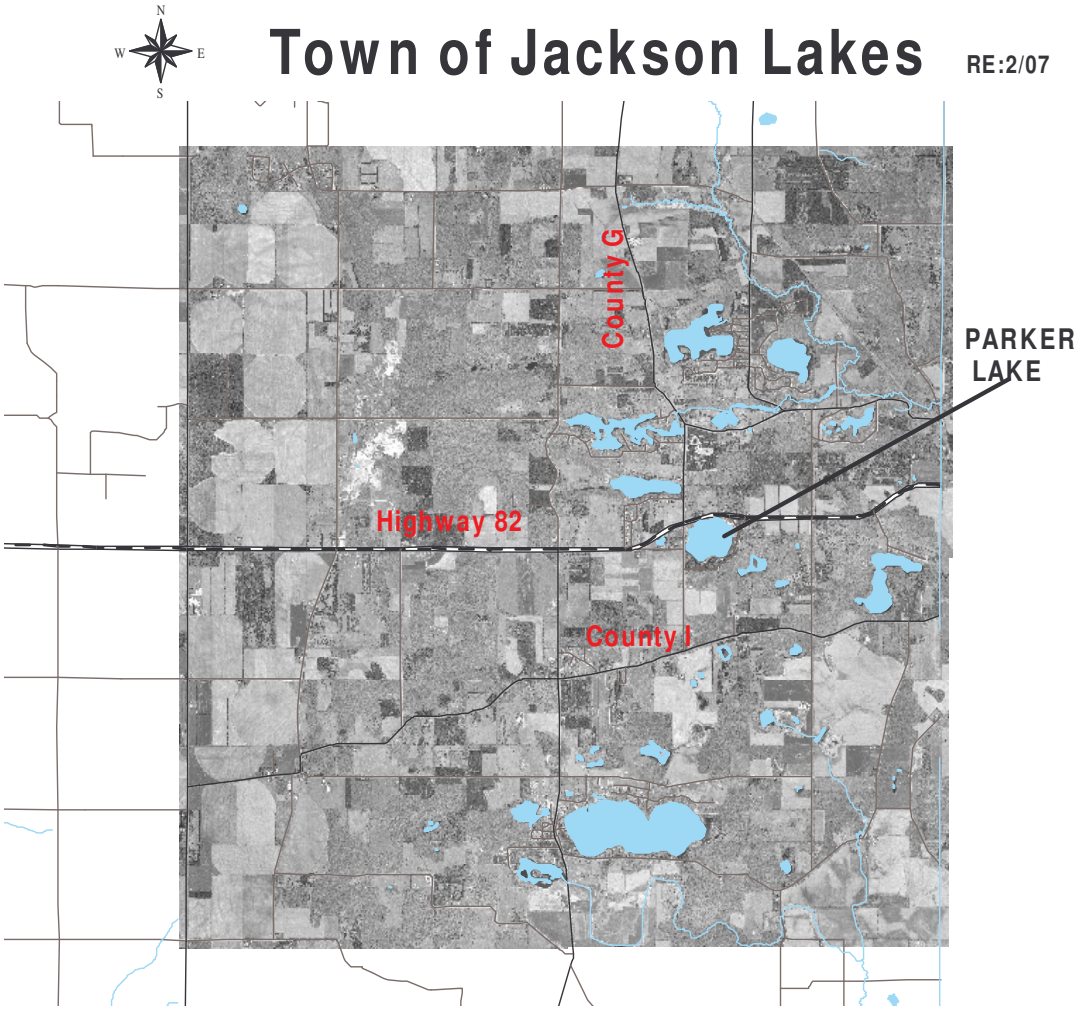
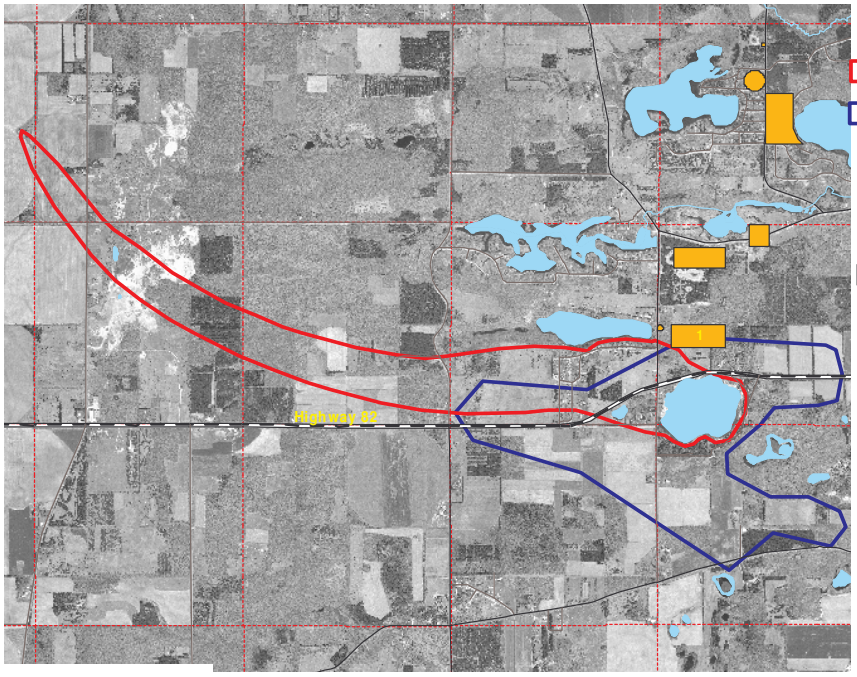
JULY 2007

Introduction

Information about Parker Lake: Parker Lake is located in the Town of Jackson, Adams County, WI (T15N, R7E), in the south central part of Wisconsin. Parker Lake is located in the Town of Jackson, Adams County, Wisconsin. The seepage lake is 60 surface acres in size. Maximum depth is 30'+, with an average depth of 13'. About 21% of the lake is over 20' deep. Parker Lake is a "seepage" lake, a natural lake fed by precipitation, surface runoff, and groundwater. With no stream outlet, water leaves the lake through groundwater seepage or by evaporation from the lake's surface. The water table in most areas around the lake is near the surface.



Parker Lake Archeological Site



RE:4/05; revised 7/06

*information from Wisconsin Historical Society

Conical mound

There are many Native American archeological sites in Adams County. One is located just north of Parker Lake and shown on the map above. Most common are the burial mounds, which can be conical or linear in shape or, in some instances, can be shaped like an animal (effigy). In order to preserve Native American Heritage, the federal act on Native American burials and correlated State Act, these sites cannot be further disturbed without permission of the federal government and input from the local tribes.

Land Use

Both the surface and ground watersheds of Parker Lake are fairly small. Studies have shown that lakes are products of their watersheds and that land use has a great impact on the water quality of that lake, especially in the amount and content of runoff from the surface. Natural undisturbed landscapes tend to have low runoff levels.

Land use categories in acreage and percent of total are shown on the chart below.

LAND USE ACRES & PERCENT OF TOTAL AREA

	Surface		Ground		Total	
Parker Lake						
Agriculture--Non Irrigated	310.91	33.03%	88.52	16.32%	399.43	26.86%
Agriculture--Irrigated	116.91	12.42%	82.23	15.17%	199.14	13.39%
Government	0	0.00%	40.67	7.46%	40.67	2.74%
Grassland/Pasture	65.61	6.97%	71.91	13.28%	137.52	9.25%
Residential	173.95	18.48%	106.28	18.78%	280.23	18.85%
Water	79.71	8.47%	15.29	2.80%	95	6.39%
Woodland	194.2	20.63%	140.71	26.19%	334.91	22.52%
total	941.29	100.00%	545.61	100.00%	1486.9	100.00%

Slightly over 45% of the surface watershed for Parker Lake is in agricultural use. Traditionally, agriculture contributes significantly to the amount of nutrients in water

Forested land is the second largest land use category in the Parker Lake surface watershed, but contributes only 3.9% of phosphorus to Parker Lake waters. Since forest floors are often full of leaves, needles and other duff, runoff from forested lands is may be more filtered than that from agricultural or residential lands.

Residential land use is the third most common land use category in Parker Lake watersheds, especially around the lake itself, where residential land use is most concentrated. This land use category, in some instances, may also contribute nutrients to the water from stormwater runoff, mowed lawns, and impervious surfaces.

The ground watershed, which is mostly divided between agricultural and woodland use, contributes 1.8% of the phosphorus to Parker Lake.

The remaining land use category in Parker Lake watersheds is wetland. Wetlands play an important role in water quality by trapping many pollutants in runoff waters and by serving as buffers to catch and control what would otherwise be uncontrolled water and pollutants. Wetlands also play an essential role in the aquatic food chain, thus affecting fishery, and also serve as spaces for wildlife habitat, wildlife reproduction & nesting, and wildlife food. Wetlands in the Parker Lake watersheds are very scattered, as shown on the map. However, because of the multiple "duties" connected with water quality, it is essential to preserve these wetlands for the continued health of Parker Lake waters.

Like many of the lakes in Wisconsin, Parker Lake is a phosphorus-limited lake. This means of the pollutants ending up in the lake, the one in the shortest supply and most affects the overall quality of the lake water is phosphorus. Land use types play a major role in determining the amount of phosphorus being loaded into the lake. Recent statistics and computer modeling suggest that currently both irrigated and non-irrigated agriculture are the greatest contributors of phosphorus to Parker Lake.*

Some aspects of phosphorus loading can't be modified by human behavior—they are simply part of the natural landscape. However, phosphorus loading from agriculture, residential and septic use of the land can be decreased or increased.

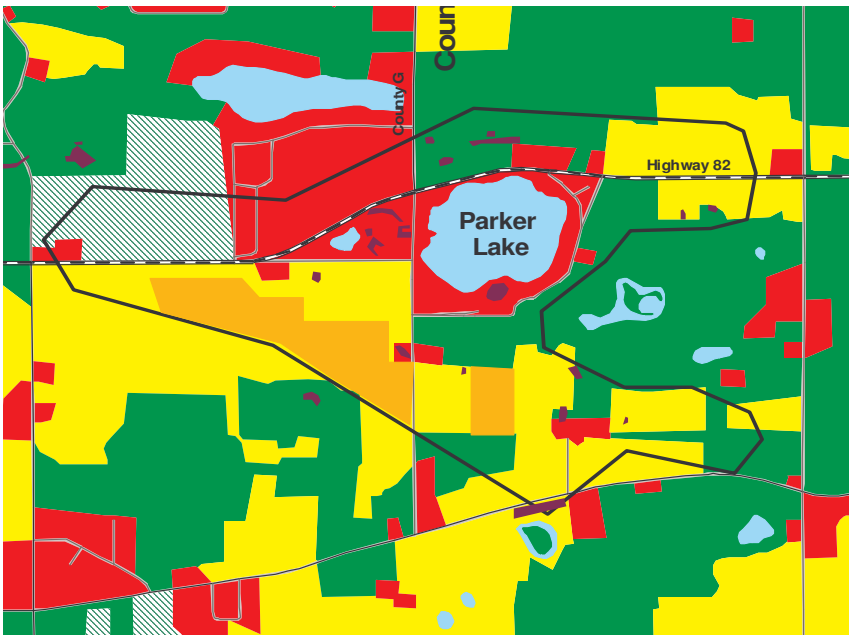
MOST LIKELY PHOSPHORUS LOADING		
BY LAND USE	%	current
Agriculture--Non Irrigated	49.4%	110
Agriculture--Irrigated	23.2%	52.8
Grassland/Pasture	3.9%	8.8
Residential	1.9%	4.4
Woodland	3.9%	8.8
Groundshed	10.8%	24.2
Lake Surface	3.7%	8.8
Septic	3.2%	7.26
Total in pounds/acre	100.0%	225.06

The computer model used for this report was developed some years ago, before much of the development around lakes in Wisconsin. Based on more recent studies, this model seems to overestimate the contributions by agriculture and underestimate the amount from developed lake shores. The model (Wisconsin Lake Management Suite) is currently being reviewed to evaluate changes caused by lakeshore development.

The table and charts below show the effect that reductions or increases of phosphorus loading in just these areas (agriculture, residential & septic) can have on overall phosphorus loading into Parker Lake. Just a 10% reduction in these areas would reduce the phosphorus loading 19.87 pounds. Initially, perhaps that doesn't sound like so much. However, considering that one pound of phosphorus can produce 500 pounds of algae, reducing the loading of phosphorus by 19.87 pounds translates into 9935 pounds less of algae!

LAND USE		current	-10%	-25%	-50%
Agriculture--Non Irrigated		110	99.00	82.50	55.00
Agriculture--Irrigated		52.8	47.52	39.60	26.40
Grassland/Pasture		8.8	8.80	8.80	8.80
Residential		4.4	3.96	3.30	2.20
Woodland		8.8	8.80	8.80	8.80
Groundshed		24.2	21.78	18.15	12.10
Lake Surface		8.8	8.80	8.80	8.80
Septic		7.26	6.53	5.45	3.63
Total in pounds/acre		225.06	205.19	175.40	125.73

Surface Water Land Use--Parker Lake



Surface Watershed Boundary

Irrigated Agriculture
Non-Irrigated Agriculture
Governmental
Open Grass Land
Residential
Water
Wetlands
Woodlands

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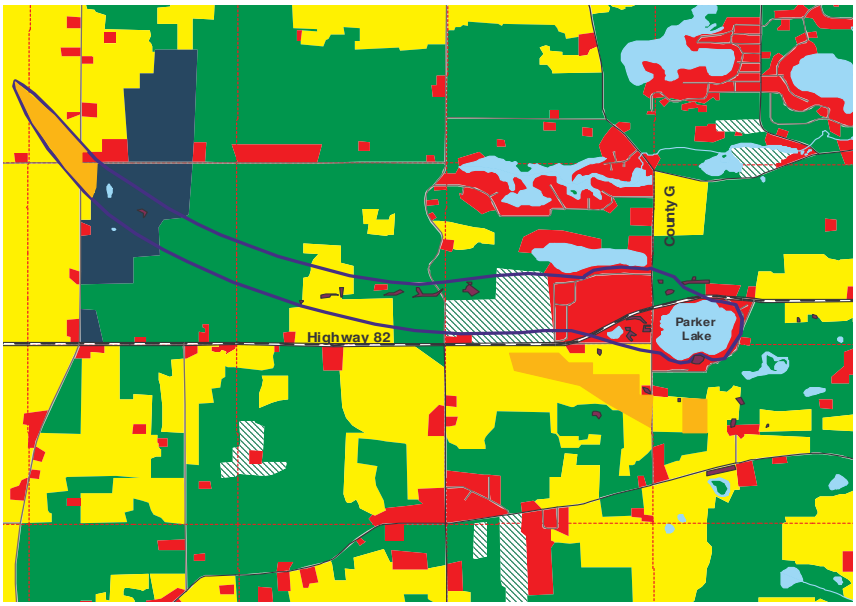
Ground Watershed Land Use--Parker Lake



Parker Lake Ground Watershed

Land Use 2004
NON-IRRIGATED AGRICULTURE
IRRIGATED AGRICULTURE
GOVERNMENTAL
OPEN GRASS LAND
RESIDENTIAL
WATER
WETLANDS
WOODLANDS

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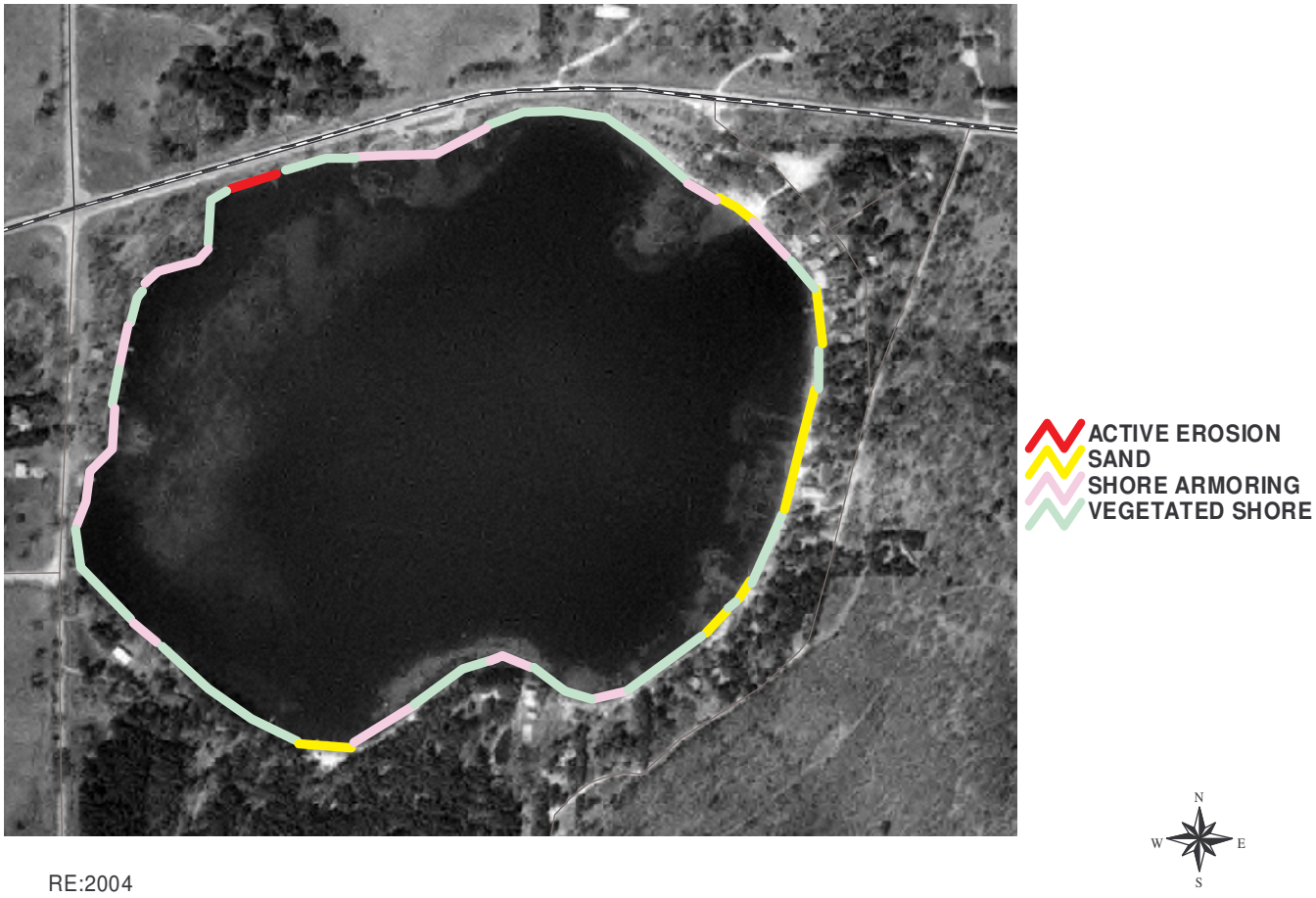
Shorelands

Parker Lake has a total shoreline of 1.16 miles (6125 feet). Most of the shore is in residential properties, including some older cabins that are quite close to the lake shore. Part of the north shore is a wayside owned by the Wisconsin Department of Transportation. On the east shore is a small resort and beach.

Some of the shores are steep. In two places, the shore runs close to a road, leaving the potential for stormwater and road runoff to the lake. Water testing done between 2004 and 2006 showed that Parker Lake had nearly double the salinity level of other lakes in Adams County. It is likely that this is due to road runoff.

Parker Lake Shoreline

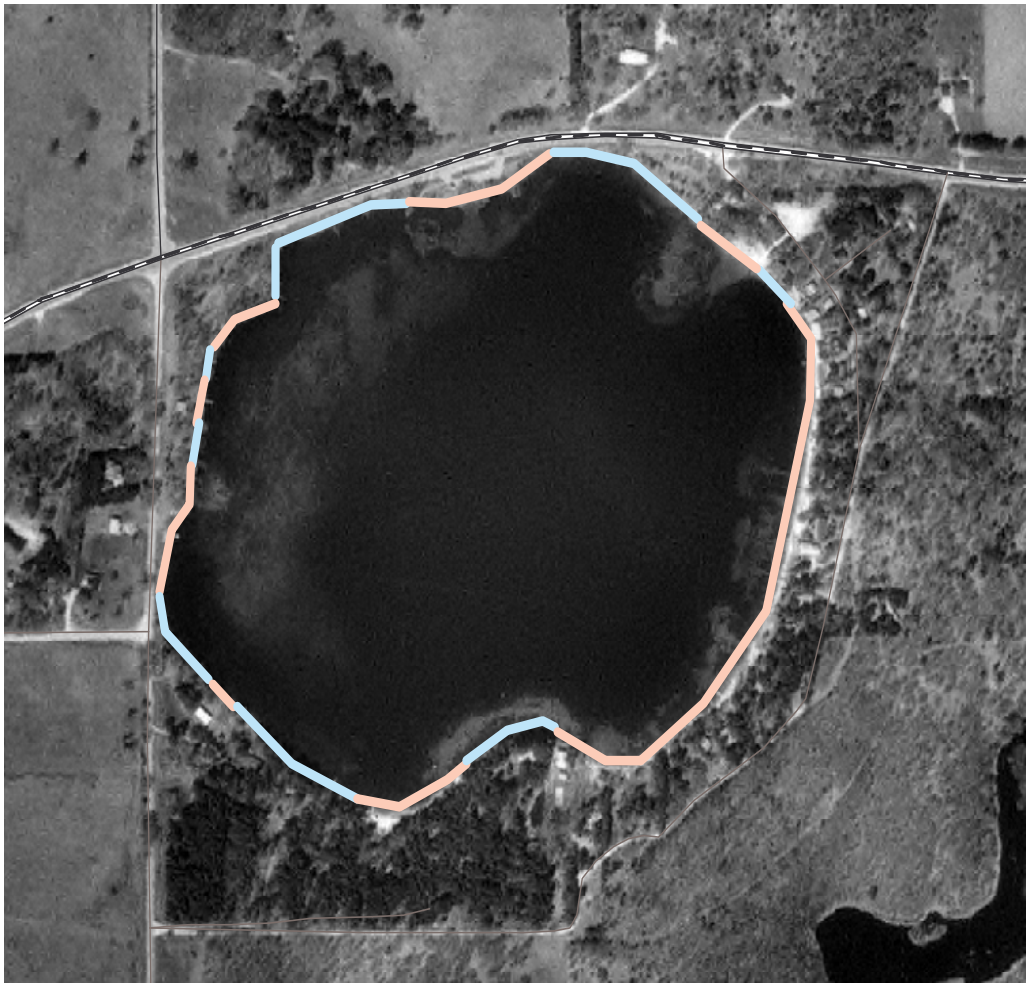


RE:2004

Native vegetation covers 41.66% of Parker Lake's shoreline. However; a 2004 shore survey showed that less than one-third of the shore had an "adequate buffer." An "adequate buffer" is defined as a native vegetation strip at least 35 feet landward from the shore.

Most of the "inadequate" buffer areas were those with mowed lawns and insufficient native vegetation at the shoreline to cover 35 feet landward from the water line.

Parker Lake Buffer Map



RE:2004

ADEQUATE BUFFER
INADEQUATE BUFFER

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Shoreland buffers are an important part of lake protection and restoration. These buffers are simply a wide border of native plants, grasses, shrubs and trees that filter and trap soil & similar sediments, fertilizer, grass clippings, stormwater runoff and other potential pollutants, keeping them out of the lake. A 1990 study by the Wisconsin Department of Natural Resources of Wisconsin shorelines revealed that a buffer of native vegetation traps 5 to 18 times more volume of potential pollutants than does a developed, traditional lawn or hard-armored shore. The filtering process and bank stabilization that buffers provide help improve a lake's water quality, including water clarity.

Example of Adequate Buffer

Example of Inadequate Buffer

Vegetated shoreland buffers help stabilize shoreline banks, thus reducing bank erosion. The plant roots give structure to the bank and also increase water infiltration and decrease runoff. A vegetated shore is especially important when shores are steep and sandy, as are many of the Parker Lake shores.

Water Quality Information

One of the measures Wisconsin uses to give a general estimate of a lake's water quality is the **trophic state index.** This index looks at a lake's water clarity, its amount of total phosphorus (the element most related to aquatic plant and algal growth), and its chlorophyll-a level (chlorophyll-a is a pigment used by algae for photosynthesis).

Depending on the trophic index score, lakes are then classified as **Oligotrophic** (good)**, Mesotrophic** (fair)**, or Eutrophic** (poor)**.**

- **Good:** Oligotrophic lakes have clear, deep water with few algal blooms. Larger game fish are often found in such lakes.
- **Fair:** Mesotrophic lakes have more aquatic plant and algae production, with occasional algal blooms and a good fishery. The water is usually not as clear as that of oligotrophic lakes.
- **Poor:** Eutrophic lakes are very productive, with lots of aquatic plants and algae. Algal blooms are often frequent in these lakes. They may have a diverse fishery, but rough fish (such as carp) are also common. Water is often cloudy or murky. Small shallow lakes are more likely to be eutrophic.

Parker Lake's overall TSI is 45 →

Score	TSI Level Description
30-40	**Oligotrophic:** clear, deep water; possible oxygen depletion in lower depths; few aquatic plants or algal blooms; low in nutrients; large game fish usual fishery
40-50	**Mesotrophic:** moderately clear water; mixed fishery, esp. panfish; moderate aquatic plant growth and occasional algal blooms; may have low oxygen levels near bottom in summer
50-60	**Mildly Eutrophic:** decreased water clarity; anoxic near bottom; may have heavy algal bloom and plant growth; high in nutrients; shallow eutrophic lakes may have winterkill of fish; rough fish common
60-70	**Eutrophic:** dominated by blue-green algae; algae scums common; prolific aquatic plant growth; high nutrient levels; rough fish common; susceptible to oxygen depletion and winter fishkill
70-80	**Hypereutrophic:** heavy algal blooms through most of summer; dense aquatic plant growth; poor water clarity; high nutrient levels

Water clarity readings are usually taken by using a Secchi disk (shown at right). **Average summer Secchi disk clarity in Parker Lake in 2004-2006 was 11.95 feet**. Records since 1992 show that the water clarity in Parker Lake has consistently remained in the "very good" clarity category. Water clarity can be reduced by turbidity (suspended materials such as algae and silt) and dissolved organic chemicals that color or cloud the water.

Increased phosphorus levels in a lake will feed algal blooms and also may cause excess plant growth. **The 2004-2006 summer average phosphorus concentration in Parker Lake was 21.61 micrograms/liter.** This is below the 25 micrograms/liter average for natural lakes in Wisconsin and places Parker Lake in the "good" category for phosphorus levels. Phosphorus levels have stayed pretty steady since 1992, but this still needs to be monitored.

The third measure used in trophic state classification is the amount of chlorophyll-a contained in the lake. The amount of chlorophyll-a found in a lake is an indication about the amount of algae in the lake. **The 2004-2006 summer average chlorophyll-a concentration in Parker Lake was 4.44 micrograms/liter.** This level of chlorophyll-a gives Parker Lake a "very good" ranking for chlorophyll-a (i.e., it's very low). Since 1992, Parker Lake's chlorophyll-a levels have remained very low.

In-Lake Habitat

Aquatic Plants

A diverse aquatic plant community plays a vital role in improving water quality, providing valuable habitat resources for fish and wildlife, resisting invasions of non-native species and checking excessive growth of the most tolerant species.

An aquatic plant survey was performed in 2005. The 0-1.5 ft depth zone support the most frequent and dense plant growth. The Parker Lake aquatic plant community is characterized by average quality and below average species diversity. Most of the plants in the lake are those that tolerate disturbance. "Disturbance" includes physical disturbances to plant beds such as boat traffic, plant harvesting, chemical treatments, dock and other structure placements, shoreline development and fluctuating water levels. Biological disturbances such an introduction of invasive species can also promote growth of disturbance-tolerant aquatic plants.

Chara spp (muskgrass), *Myriophyllum spicatum* Eurasian watermilfoil, an invasive), and *Najas guadalupensis* (Southern naiad)) were the most common aquatic species.

Important to maintaining a good quality, diverse aquatic plant community is an integrated aquatic plant management plant that controls the invasive plants in the lake. The most prevalent invasive exotic in Parker Lake is currently *Myriophyllum spicatum* (Eurasian watermilfoil), which had an occurrence frequency of 14%. Chemical treatment for EWM occurred in 2007.

Other invasive plants found were *Potamogeton crispus* (Curly-Leaf Pondweed) and *Phalaris arundinacea* (Reed Canarygrass). The latter two are less common at Parker Lake.

Curly-Leaf Pondweed

Purple Loosestrife

Eurasian Watermilfoil

More detailed information can be found in the aquatic plant report of the 2005 survey, available on request from the WDNR or Adams County Land & Water Conservation Department.

Emergent Plants in Parker Lake

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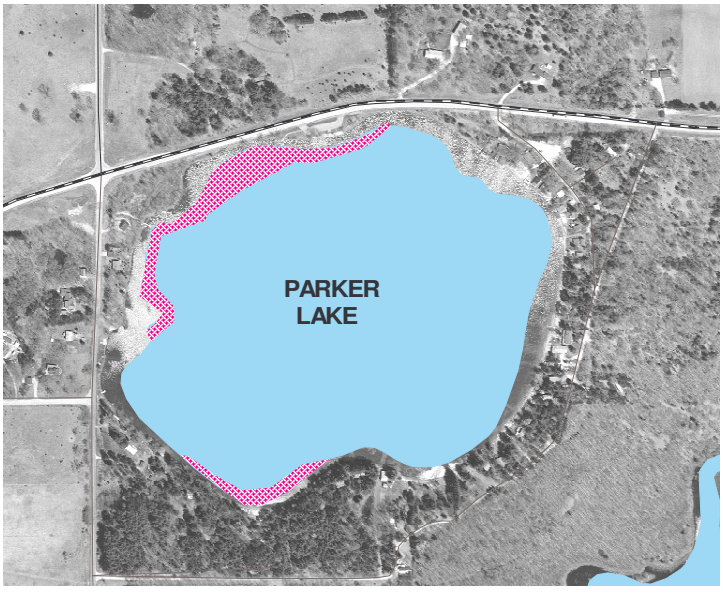
Emergent Plants Found

Floating-Leaf Plants in Parker Lake



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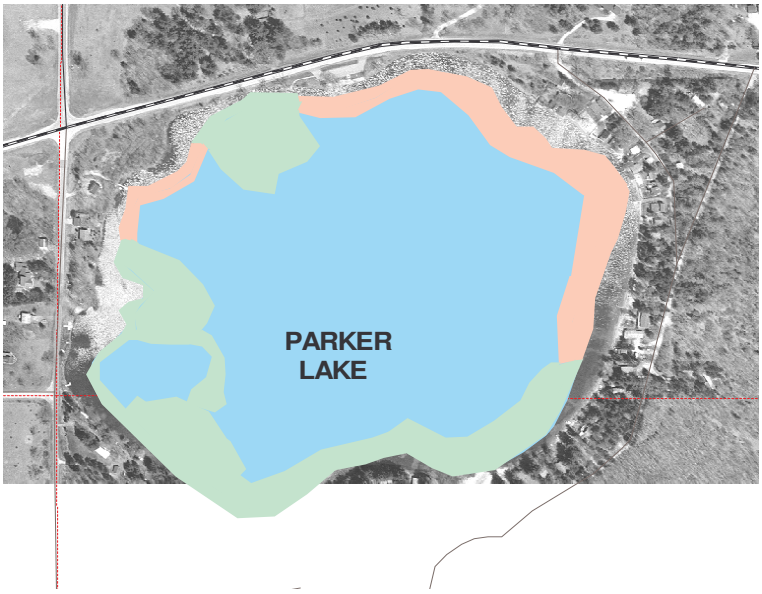
Floating-Leaf Plants Found

Submergent Vegetation in Parker Lake

RE:6/06

Aquatic Vegetation Found

Exotics Distribution in Parker Lake



RE:6/06

Eurasian Watermilfoil Only Found

Eurasian Watermilfoil & Curly-Leaf Pondweed Both Found

Fishery/Wildlife/Endangered Resources

There was a chemical kill of fish in 1966 to remove carp from Parker Lake. WDNR stocking records for Parker Lake go back to 1967, when the lake was stocked with walleye, rainbow & brown trout and bluegills. Stocking of these three fish continued until 1981, when it was determined that stocking for walleye and rainbow trout weren't succeeding in establishing a population. After that time, largemouth bass and brown trout were stocked.

Fishing inventories through the years tended to show that bluegill, largemouth bass and pumpkinseed were either abundant or common (depending on the year), with yellow perch, northern pike and bullheads present or scarce.

Muskrat are also known to use Parker Lake shores for cover, reproduction and feeding. Seen during the field survey were various types of waterfowl, songbirds, and turkey. Frogs and salamanders are known, using the lake shores for shelter/cover, nesting and feeding. Turtles and snakes also use this area for cover or shelter in this area, as well as nested and fed in this area.

No endangered resources are reported to occur in the Parker Lake watersheds.

BLUEGILL

LARGEMOUTH BASS

Recommendations

Lake Management Plan

- By the end of 2008, Parker Lake Association should develop a lake management plan. The Adams County Land & Water Conservation Department is available for assistance, if requested.
- The lake plan needs to include at least the following aspects concerning the management of the lake: aquatic species management; control/management of invasive species; wildlife and fishery management; nutrient budgeting; shoreland protection; water quality protection.

Watershed Recommendations

- Inventory surface and ground watersheds, documenting runoff from any livestock operations to surface waters, soil erosion sites, agricultural producers not complying with nutrient management plans and/or irrigation management plans.
- Encourage these landowners, with the assistance of Adams county Land & Water Conservation Department, to develop and implement plans to address issues identified in the inventory.

Water Quality Recommendations

- All lake residents should practice best management on their lake properties, including keeping septic systems maintained in proper condition and pumped every three years, eliminating the use of lawn fertilizers, cleaning up pet wastes and not composting near the water.
- Reducing the amount of impervious surface around the lake and management of stormwater runoff will also help maintain water quality by reducing the amount of pollutants that end up in the lake. Studies have shown an impervious surface level as low as 20% can negatively impact water quality.
- Residents should become involved in the Citizen Lake Water Monitoring Program, including water quality monitoring, invasive species monitoring & Clean Boats, Clean Waters program.
- Lake residents should protect and restore natural shoreline around Parker Lake. Too much of the shoreline is developed and/or disturbed. The lower frequency and density of the most sensitive plant species in the disturbed shoreline areas is evidence that shore disturbance is impacting the aquatic plant community of the lake.

- Wooded undisturbed shores should be left undisturbed and protected. Such shores naturally filter and hold pollutants that would otherwise end up in the lake.
- A plan should be developed to divert or reduce runoff from the highway and road that run very near Parker Lake. This plan would involve the Parker Lake Association, the county highway department, and the town highway department, as well as the Adams County Land & Water Conservation Department. Such a plan is seen as necessary to reduce the contamination level of the lake.

Aquatic Plant Recommendations

- All lake users should protect the aquatic plant community in Parker Lake by assisting in developing and implementing an integrated aquatic plant management plan that uses multiple methods of control.
- The Parker Lake Association should maintain exotic species signs at the boat landing and wayside and contact DNR if the signs are missing or damaged.
- The Parker Lake Association should continue monitoring and control of Eurasian Watermilfoil maintain the most effective methods and modify if necessary. The Lake Association should investigate ways to increase treatment effectiveness in the deeper water. Residents may need to hand-pull scattered plants.
- A milfoil weevil survey should be conducted on Parker Lake in order to evaluate milfoil weevil availability for assistance in controlling the Eurasian Watermilfoil.
- Shores with inadequate buffers need to restore the buffers to an adequate condition to provide winter habitat for the weevils, as well to assist in maintaining water quality.
- Lake residents should get involved in the county-sponsored Citizen Aquatic Invasive Species Monitoring Program. This will allow not only noting changes in the Eurasian Watermilfoil pattern, but also those for Curly-Leaf Pondweed and Reed Canarygrass. Noting the presence and density of these plants early is the best way to take preventive action to keep them from becoming a bigger problem.
- To avoid continued disturbances in the aquatic plant and lake bottom community, the Parker Lake Association should consider making the lake a no-wake lake or at least reducing the amount of time wakes are allowed on the lake. If the aquatic plant community is to improve, the level of disturbances needs to be reduced.